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Government of India - Ministry of Railways
Research, Designs & Standards Organization,
LUCKNOW - 226011



No. EL/3.1.35/23

Dated: 27.05.2015

Chief Electrical Engineers,

Northern Railway, Baroda House, New Delhi-110001
Western Railway, Churchgate, Mumbai- 400 020
Chittaranjan Locomotive Works, Chittaranjan (WB)- 713331

MODIFICATION SHEET No. RDSO/2013 /EL/MS/0424 Rev. '1', Dated:27.05.2015

- 1.0 **Title:** Use of Safety Device as an Emergency Support to prevent falling of aluminum gear case in WAP5 class of Electric Locomotive, during run in the event of breakage of its mounting lug (of aluminum gear case) due to sudden impulse loading.
- 2.0 **Object:** To avoid the risk of falling of bottom half of aluminum gear case on line in the event of breakage of mounting lug (aluminum gear case) of WAP5 class Electric Locomotives. Such sudden breakage/crack may take place due to sudden impulse loading, which is higher than the design loads.
- 3.0 **Existing arrangement with cross references of respective design document:**

A gear case is fitted on each axle, which is suspended in the bogie frame at the nose end by a support arm. The arm is fitted with rubber Spheriblocs to allow for twist and movement of the axle. The other end of the gear case is supported on axle by the main gear, within the gear case.

OEM of WAP5 locomotive, i.e. Bombardier Transportation (BT) was carried out various test with the help of an NABL accredited Lab to know the actual reason of instantaneous breakage of lugs. According to the test report, sudden impulse loading higher than the design loads, during run was found responsible for instantaneous breakage of lugs.

To avoid the risk of falling of bottom half of aluminum gear case on line in the event of breakage of mounting lug in WAP5 electric locomotives an emergency support arrangement was conceived and designed along with M/s BT.

RDSO has issued modification sheet no. RDSO/2013/EUMS/0424 Rev.'0' dated: 21.03.2013 for the use of safety device as an emergency support as per drawing no. 3EYP300141R0001.
- 4.0 **Modified arrangement**

Safety device as per drawing no. 3EYP300141R0001 is created problem during fitment and maintenance work. As such RDSO has designed modified drawing no. SKEL-5003 (Alt. '0') in 11 sheets for the use of safety device in WAP5 locomotives. Successful fitment trial of these modified safety device has also been carried out at ELS/GZB.

4.1 Procedure for fitment of Safety Device in Loco:

As per RDSO drawing no. SKEL-5003 (Alt. 0) in 11 Sheets.

5.0 Application to Class of Locomotives:

WAP5 class of Electric Locomotives.

6.0 Material Required:

As per RDSO drawing no. SKEL-5003 (Alt. 0) in 11 Sheets

7.0 Material Rendered Surplus : Nil

8.0 Reference : Successful Fitment trial of modified safety device at ELS/GZB

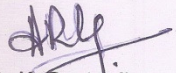
9.0 Modification Drawing :

RDSO drawing no. SKEL-5003 (Alt. 0) in 11 Sheets

10.0 Agency of Implementation :

- 10.1 All the Sheds
- 10.2 Workshop
- 10.3 CLW


Encl: As above


(A. K. Rastogi)
for Director General/Electrical

Copy to:

- (i) Secretary (Electric Traction), Railway Board, Rail Bhawan, New Delhi 110001:
- (ii) Sr.DEE/RS, ELS/GZB, NR: For information and necessary action please.
- (iii) Sr.DEEITRS, ELS/BRC, WR: For information and necessary action please.

Encl: As above


(A. K. Rastogi)
for Director General/Electrical

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As per RDSO drawing no. SKEL-5003 (Alt. 0) in 11 Sheets.

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6.0 Material Required:

As per RDSO drawing no. SKEL-5003 (Alt. 0) in 11 Sheets

7.0 Material Rendered Surplus : Nil

8.0 Reference : Successful Fitment trial of modified safety device at ELS/GZB


9.0 Modification Drawing :

RDSO drawing no. SKEL-5003 (Alt. 0) in 11 Sheets

10.0 Agency of Implementation :

- 10.1 All the Sheds
- 10.2 Workshop
- 10.3 CLW

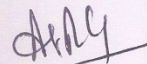
Encl: As above


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Encl: As above

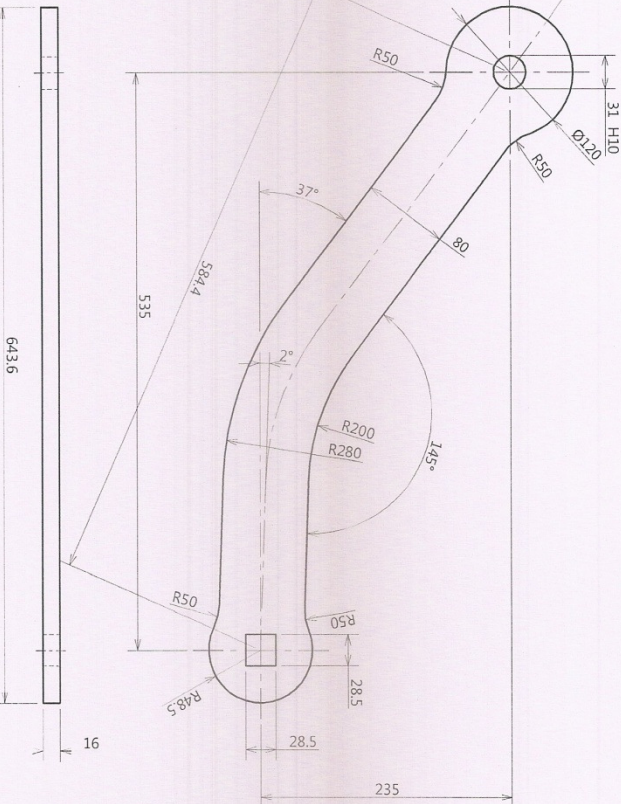

(A. K. Rastogi)
for Director General/Electrical

Material	45 C 8 ; IS : 5517 - 1993 + Normalized
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Material	45 C 8 ; IS : 5517 - 1993 + Normalized
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1. All dimensions are in millimeter ; Unless otherwise specified

1. All dimensions are in millimeter. Unless otherwise specified
2. All machined surface roughness value as per IS : 3073-1996
3. All machined untolerance dimensions as per IS : 2102 (M) -1993
4. All Sharpe edges to be rounded off.



Ref.	Part No.	Description	Drawing No.	Qty / Assy	Material	Unit	Total Weight Kg.	Remarks
	M01	lever arm	SKEE-5003 (Alt. 0) Sheet 2/11	1	45 C 8, JIS 5517 - 1993	7.300	7.300	

Bill of Material

Detail of Safety Device for WAP5 Locomotive Gearbox

LEVER ARM

FIRST ISSUED

SUPERSEDES

RDSO ELECT. DTE	SKEL-5003 (Alt. 0)
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SHEET 2 / 11

SUPERSEDED BY

Dt	23.04.15
D	<i>Pat</i>
C	<i>Amrinder</i>
T	<i>Pat</i>

STATUS	ALT	REF.NO.	DESCRIPTION	APPD.BY	DATE

RDSO ELECT. DTE	Drawing No. SKEL-5003 (Alt. 0) SHEET 2 / 11	SUPERSEDED BY
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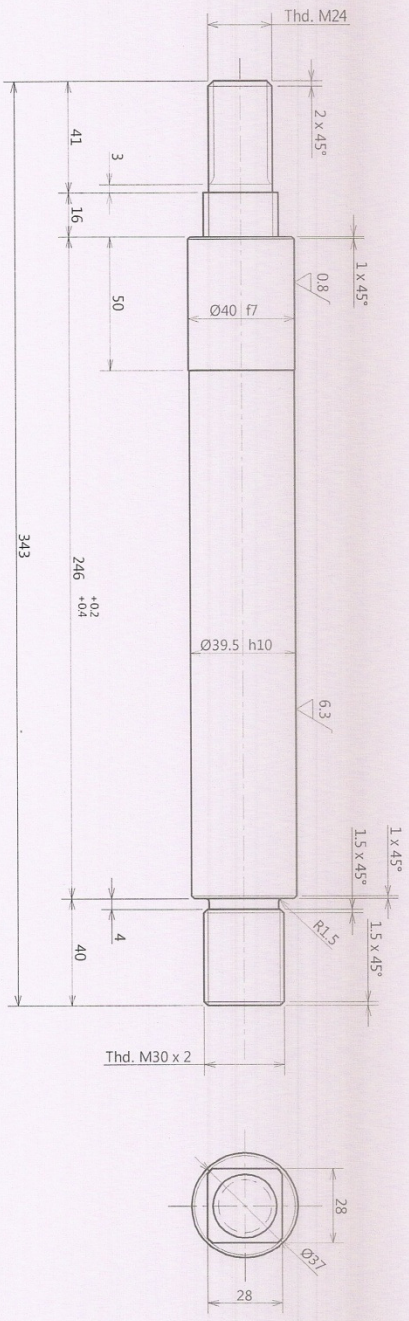
6.3 The Rest

Technical Specifications

Material	40NiCrAlMo3 ; IS : 5517 - 1993 Or En 24 / BS : 970 Forged
Heat Treatment	Volume Hardened & Double Tempered
Hardness Value	250 - 280 BHN

Technical Notes :

1. All dimensions are in millimeter ; Unless otherwise specified
2. All machined surface roughness value as per IS : 3073-1996
3. All machined untolerance dimensions as per IS : 2102 (W) - 1993
4. All Shape edges to be rounded off.



Ref No.	Part No.	Description	Drawing No.	Qty / Assy	Material	Unit	Total	Remarks
Bill of Material								

Detail of Safety Device for WAP5 Locomotive Gearbox

PIN

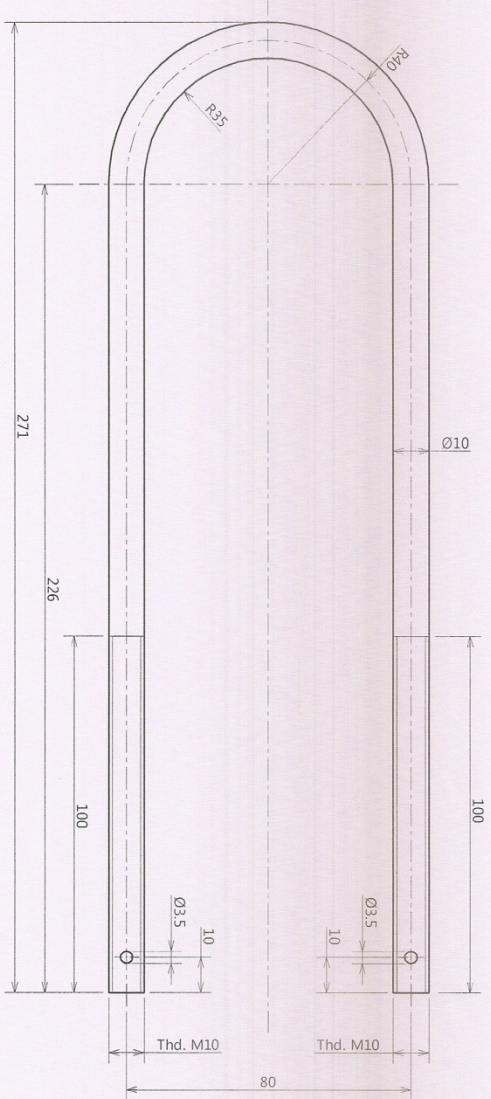
FIRST ISSUED
SUPERSEDES

RDSO ELECT. DTE
Drawing No. SKEL-5003 (Alt. 0)
SHEET 3 / 11
SUPERSEDED BY

Dt	23.04.15
D	23.04.15
C	23.04.15
T	23.04.15

STATUS	ALT	REF.NO.	DESCRIPTION	APPD BY	DATE
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Technical Specifications	
Material	45 C 8 ; IS : 5517 - 1993 + Normalized
Technical Notes :	
1. All dimensions are in millimeter ; Unless otherwise specified	
2. All machined surface roughness value as per IS : 3073-1996	
3. All machined untolerance dimensions as per IS : 2102 (M) - 1993	
4. All Sharpe edges to be rounded off.	



Ref. No.	Part No.	Description	Drawing No.	Qty / Assy	Material	Unit	Total	Remarks
				1	45 C 8 IS : 5517 - 1993	0.300	0.300	
Bill of Material								
Detail of Safety Device for WAP5 Locomotive Gearbox								
D-SHACKLE								
FIRST ISSUED								
SUPERSEDES								
RDSO ELECT. DTE								
Drawing No. SKEL-5003 (Alt. 0)								
SHEET 4 / 11								
SUPERSEDED BY								

STATUS	ALT	REF. NO.	DESCRIPTION	APPD. BY	DATE

Dt	23.04.15
D	GM
C	GM
T	GM

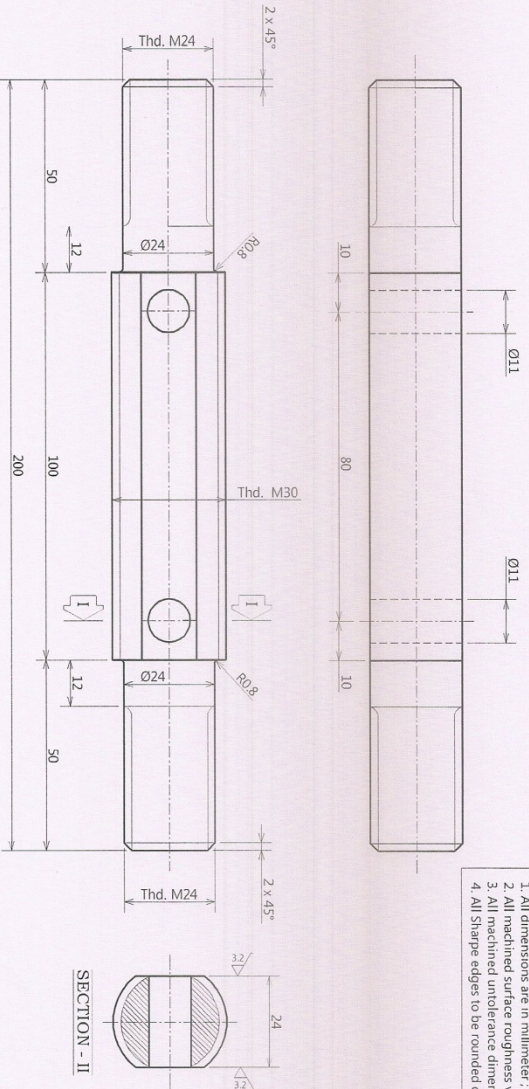
6.3 The Rest

Technical Specifications

Material	40NiCr4Mo3 : IS : 5517 - 1993 Or En 24 / BS 970	Forged
Heat Treatment	Volume Hardened & Double Tempered	
Hardness Value	250 - 280 BHN	

Technical Notes :

1. All dimensions are in millimeter, Unless otherwise specified
2. All machined surface roughness value as per IS : 3073-1996
3. All machined untolerance dimensions as per IS : 2102 (M) - 1993
4. All Sharpe edges to be rounded off.



Ref Part No.	Description	Drawing No.	Qty / Asfy	Material	Unit	Total Weight Kg	Remarks
M01	Threaded Pin	SKEL-5003 (Alt. 0) Sheet 5/11	1	40NiCr4Mo3 IS : 5517-1993	0.660	0.660	

Bill of Material

Detail of Safety Device for WAP5 Locomotive Gearbox

THREADED PIN

FIRST ISSUED
SUPERSEDES

RDSO ELECT. DTE
Drawing No. SKEL-5003 (Alt. 0)
SHEET 5 / 11
SUPERSEDED BY

Dt	23.04.15
D	<i>[Signature]</i>
C	<i>[Signature]</i>
T	<i>[Signature]</i>

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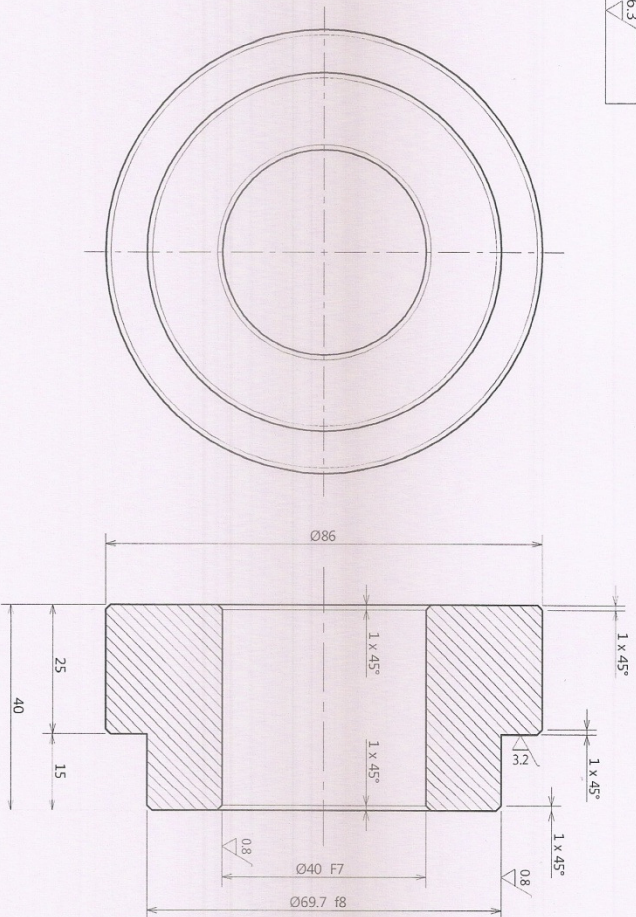
Technical Specifications	
Material	Steel Wire
Technical Notes : 1. All dimensions are in millimeter ; Unless otherwise specified 2. All machined surface roughness value as per IS : 3073-1996 3. All machined untolerance dimensions as per IS : 2102 (M) - 1993 4. All Sharpe edges to be rounded off.	

Detail of Safety Device for WAP5 Locomotive Gearbox			
SLING WIRE			
FIRST SUPPLY			
SUPERSEDES			
RDSO ELECT. DTE			
Drawing No. SKEL-5003 (Alt. 0)			
SHEET 7 / 11			
SUPERSEDED BY			

Dt	23.04.15
D	By
C	23.04.15
T	23.04.15

STATUS	ALT	REF. NO.	DESCRIPTION	APPD BY	DATE
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6.3 The Rest



Technical Specifications

Material 45 C 8 : IS : 5517 - 1993 + Normalized

Technical Notes :

1. All dimensions are in millimeter : Unless otherwise specified
2. All machined surface roughness value as per IS : 3073-1996
3. All machined untolerance dimensions as per IS : 2102 (M) - 1993
4. All Sharpe edges to be rounded off.

Ref. No.	Part No.	Description	Drawing No.	Qty / Assy	Material	Unit	Total	Remarks
AM07	Disc-2	SKEL-5003 (Alt. 0) Sheet 8/11	1	45 C 8 : IS : 5517 - 1993	1.200	1.200		

Bill of Material

Detail of Safety Device for WAP5 Locomotive Gearbox

DISC-2

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SUPERSEDES

RDSO ELECT. DTE

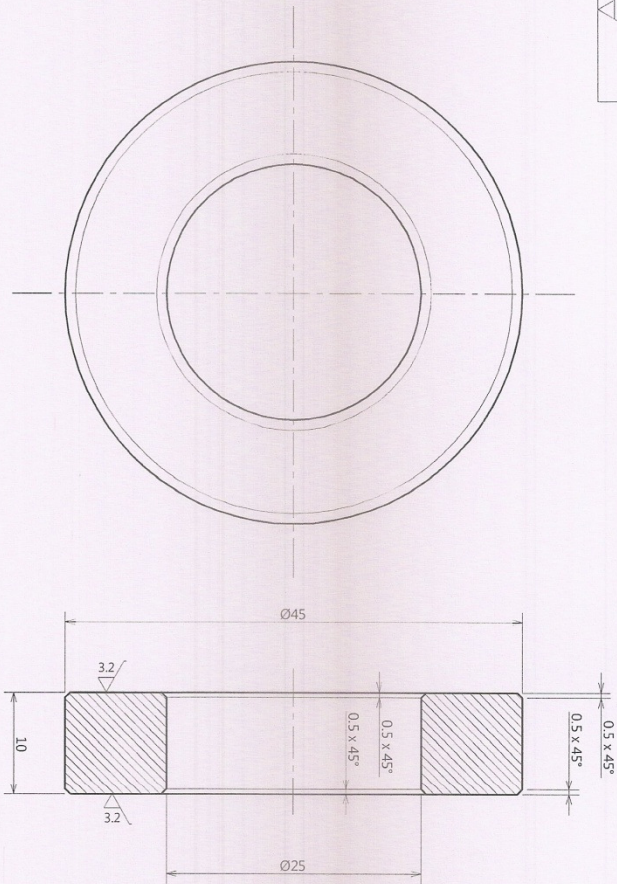
Drawing No.
SKEL-5003 (Alt. 0)
SHEET 8 / 11

SUPERSEDED BY

Dt	23.09.15
D	By
C	By
T	By

STATUS	ALT	REF. NO.	DESCRIPTION	APPD. BY	DATE

6.3 The Rest



Technical Specifications

Material 45 C 8 : IS : 5517 - 1993 + Normalized

Technical Notes:

1. All dimensions are in millimeter : Unless otherwise specified
2. All machined surface roughness value as per IS : 3073-1996
3. All machined untolerance dimensions as per IS : 2102 (M) - 1993
4. All Sharpe edges to be rounded off.

Dt	23.08.15
D	Quif
C	Quif
T	Quif

STATUS	ALT	REF. NO.	DESCRIPTION	APPROBY	DATE

Ref. No.	Part No.	Description	Drawing No.	Qty / Assy	Material	Unit	Total Weight Kg.	Remarks
M08	Spacer		SKEL-5003 (Alt. 0) Sheet 9/11	1	45 C 8 : IS : 5517 - 1993	0.080	0.080	
Detail of Safety Device for WAPS Locomotive Gearbox								
Bill of Material								
SPACER								
FIRST ISSUED								
SUPERSEDES								
RDSO ELECT. DTE			Drawing No. SKEL-5003 (Alt. 0)			SUPERSEDED BY		
			SHEET 9 / 11					

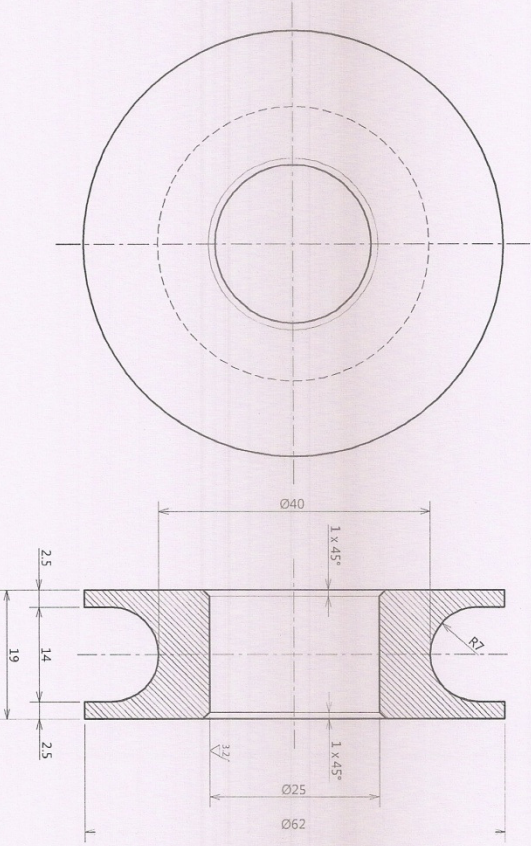
6.3 The Rest

Technical Specifications

Material 45 C 8 ; IS : 5517 - 1993 + Normalized

Technical Notes :

1. All dimensions are in millimeter ; Unless otherwise specified
2. All machined surface roughness value as per IS : 3073-1996
3. All machined untolerance dimensions as per IS : 2102 (M) - 1993
4. All Sharpe edges to be rounded off.



Ref No.	Part No.	Description	Drawing No.	Qty / Material	Unit	Total Weight Kg.	Remarks
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Bill of Material

Detail of Safety Device for WAPS Locomotive Gearbox

THIMBLE

FIRST ISSUED
SUPERSEDED

RDSO ELECT. DTE
Drawing No. SKEL-5003 (Alt. 0)
SHEET 10 / 11
SUPERSEDED BY

Dt	23.04.15
D	Quaf
C	Quaf
T	Quaf

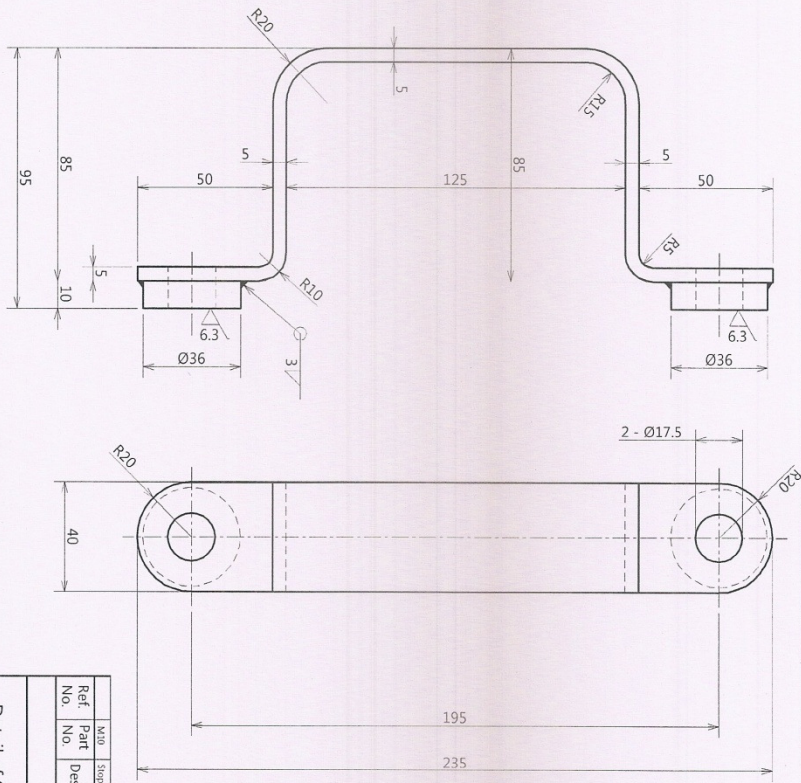
STATUS	ALT	REF.NO.	DESCRIPTION	APPD.BY	DATE
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Technical Specifications

Material Fe410WB / IS : 2062 - 1992 (Fabricated)

Technical Notes:

1. All dimensions are in millimeter. Unless otherwise specified
2. All machined surface roughness value as per IS : 3073-1996
3. All machined untolerance dimensions as per IS : 2102 (M) - 1993
4. All Sharpe edges to be rounded off.



Ref. No.	Part No.	Description	Drawing No.	Qty / Assy	Material	Unit	Total	Remarks
		Stopper	SKEL-5003 (Alt. 0) Sheet 11/11	1	Fe410WB / IS : 2062 - 1992	0.600	0.600	

Bill of Material

Detail of Safety Device for WAP5 Locomotive Gearbox

STOPPER

FIRST ISSUED
apru

SUPERSEDES

RDSO ELECT. DTE Drawing No. SKEL-5003 (Alt. 0) SHEET 11 / 11 SUPERSEDED BY

Dt	23.04.15
D	<i>apru</i>
C	<i>apru</i>
T	<i>apru</i>

STATUS	ALT	REF. NO.	DESCRIPTION	APPD. BY	DATE
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